

Catacel and NASA Glenn: Improving Efficiency of Hydrogen Production



TECHNOLOGY

The NASA Glenn Research Center possesses unique capabilities, testing equipment, and data that are integral to a project initiated by Catacel Corporation. Catacel built a near commercial size stackable structural reactor (SSR™) for hydrogen production, with testing and modification assistance provided by NASA Glenn.

COMMERCIAL APPLICATION

Catacel manufactures catalysts, heat exchangers, and metal honeycombs for industrial and distributed energy markets. The company began working with stackable structural reactors (SSR™) in 2003 and is on track to introduce the SSR product to the market in 2006.

In 2005, Catacel received a significant boost toward achieving this goal. Funding provided through a GATE Partnership Award has allowed the company to collaborate with the NASA Glenn Research Center in building and testing a near commercial size SSR for hydrogen production. NASA Glenn set up a lab for installation of SSR units, analyzed the design of the SSR, suggested modifications, and tested SSR units, comparing results to those of standard metal alloy tubes filled with ceramic media.

The current hydrogen production process uses high temperature alloy tubes filled with ceramic media, which is heated by natural gas. This process is inefficient, due to the uneven distribution of heat through the ceramic media, and requires regular expensive downtime, due to the periodic breakdown of the ceramic media, which must be replaced. The SSR eliminates both of these issues by improving hydrogen production efficiency by better heat transfer through the use of metal foil with a special catalyst coating instead of ceramic media, and by permitting stackability, easy insertion and removal, and durability, hence tripling the device's continuous operation lifespan.



Catacel's stackable structural reactor will enable a new efficiency in commercial hydrogen production.

SOCIO-ECONOMIC BENEFIT

NASA Glenn's tests of the performance of Catacel's SSR indicated that the Catacel device will be an improvement over existing technology. This system will provide greater efficiency in the production of hydrogen and also a significant cost savings to large producers. Cost savings are expected to reach 30–35 percent per plant, resulting in an estimated annual savings of \$30 million.

Hydrogen is currently used commercially and by NASA labs and space missions in a variety of ways. As the nation continues to seek alternative sources of electric power, hydrogen could take on an increased importance as a fuel material for use in fuel cells.

NASA APPLICATIONS

The NASA Glenn Combustion Branch has expertise and interest in the process of combustion, the development of catalysts, and the reforming of fossil fuels into hydrogen that can be used in fuel cell applications. Hydrogen fuel cells show promise as a clean energy source for aviation and space exploration. This expertise allowed NASA Glenn to provide capabilities, test equipment, and data integral to Catacel's project.

Point of Contact:



GATE
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The Glenn Alliance for Technology Exchange (GATE) is a collaborative effort of the following three organizations:



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